Notice of Non-Compliant Amendment mailed 12/16/09

The Notice of Non-Compliant Amendment mailed on 12/16/09 was sent in error. The Notice is vacated and withdrawn. No response to that Notice is due. The claim amendments filed 7/6/09 have been entered.

112, second paragraph, Essential steps omitted

Claims 33, 35-38, and 40, directed to a sludge dewatering method, are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps. See MPEP § 2172.01. The omitted step are: 1) Contacting the sludge with polyacrylamide and 2) dewatering.

Claim 33 is directed to a method for dewatering sludge. The claimed method recites only the step of adding to the sludge a polymeric quaternary ammonium compound even though the specification states that each "polyquaternary amine [sic] chemical component used in the chemical method is not large enough to create large enough flocs to dewater the sludge." See also col 5 lines 53-57. Accordingly, any claim that does not recite the addition of both a polymeric quaternary ammonium compound and a polyacrylamide fails to recite an essential step of the process for dewatering sludge. Claims 34 - 37 are rejected for the same reasons as claim 33 given that none of claims 34 - 37 recites the step of "further comprising adding polyacrylamide to the sludge," or the like. Note that claims 38, 73 are not rejected on the foregoing basis. Applicant admits at page 28 of the 1/9/08 response that his "Methods One and Two... teach the need of a polyacrylamide, cationic and anionic, respectively, along with the

primary component" (emphasis added).[1] Accordingly, the rejection is maintained because the claims of this application are properly directed only to the inventions of Method One and Method Two.

Art Based Rejections

Eberhard, McGrow, and Williams

Claims 1 – 2, 4 – 8, 10 – 16, 22, 24-28, 33, 35-37, 41, 44, 45- 48, 51-55, 58, 67-70, 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5019267 to Eberhard in view of USP 5213693 to McGrow (incorporating 5178774 to Payne) and USP 5561520 to Willliams.

USP 5019267 to Eberhard describes a method for dewatering biological sludge from a digestion process. Applicant agrees that Eberhard describes dewatering of a biological sludge from a thermophilic digestion process using *inter alia* a cationic polyacrylamide.[2] Specifically, Eberhard describes heating the biological sludge to 75°C (Example 3, claim 8) then adding a cationic polymeric flocculent ZETAG 92 (Eberhard at col 5 line 58). ZETAG 92 is an ultra-high molecular weight polyacrylamide carrying a medium charge density (USP 5561520 to Willliams, at col 6 line 10). Accordingly, Eberhard describes a method for dewatering biological sludge from a thermophilic digestion process comprising the step of adding to the thermophilic biological sludge a cationic polyacrylamide such that the polyacrylamide enhances dewatering of the

[1] Therefore, it is only Methods One and Two which teach the need of a polyacrylamide, cationic and anionic, respectively, along with the primary component.
[2] Applicant's 7/6/09 Response at page 16 and 11/3/08 Response, at page 40 of 44, line 7.

sludge. Eberhard does not describe the addition of a polymeric quaternary ammonium compound, as primary component, to the biological sludge.

USP 5213693 to McGrow describes a method of facilitating the dewatering of an aqueous suspension, e.g., sewage sludge, by adding a low molecular weight poly(DADMAC)(col 4line 37) (or polyamine made by condensation of epichlorohydrin with an amine) (col 4 line 29) coagulant solution along with, i.e., simultaneously with, a high molecular weight cationic polyacrylamide flocculent solution (col 5 line 55). McGrow teaches that use of the poly(DADMAC) or poly(epichlorohydrin-amine) in addition to the cationic polyacrylamide offers numerous advantages over the traditional methods of using the high molecular weight cationic polymeric flocculent alone (col 6 line 30). The advantages include flocs that are small, evenly structured, highly filterable, having good shear stability, and a system that is relatively resistant to underdosing and overdosing. Accordingly, prior art problems of gelatinous flocs, disadvantageous coring, and reduced productivity experienced when the high molecular weight cationic polymeric flocculent was used alone can be avoided. Higher cake dry solids result due to the better floc structure. Overall, the McGrow dewatering process gives reduced cycle time, drier cake, better filter or belt press capacity utilization, improved filtrate quality, better cake release from the filter cloth, and cleaner filter cloths (col 6 lines 30-45).

For any combination of the aforementioned advantages, it would have been obvious to the person having ordinary skill in this art to have used a combination of poly(DADMAC) coagulant, e.g., Percol 368, and high molecular weight cationic

polyacrylamide flocculent, e.g., PERCOL 757, in place of Eberhard's use of ZETAG 92 alone. USP 4396513 shows that PERCOL 757 is a cationic polyacrylamide.

Per claim 5, McGrow teaches that the weight ratio of coagulant to flocculent be in the range 0.7 – 2 (col 5 line 63). A ratio of 0.7 is “approximately 1:1.” Alternatively, a weight ratio of 1:1 would have been obvious given the teaching of 0.7 – 2.

Per claims 6, 27 McGrow teaches that the weight ratio of coagulant to flocculent of 0.1 (col 5 line 59). This ratio is the same as a polymeric quaternary ammonium compound : cationic polyacrylamide weight ratio of 1:1.

Per claims 7 and 28, the dosage of polymer added per percent total solids in the sludge is a matter of routine experimentation, so optimization of the same would have been prima facie obvious. Besides, McGrow's example of "about 4 kg per ton dry solids sludge" (col 7 line 50) corresponds to about 44 ppm:1% solids.[3] Claim-recited "about 50 ppm : 1% " reads on about 44 ppm:1% solids, as described by McGrow. Furthermore, the range of about 44 ppm: 1% solids to about 55 ppm: 1% solids is suggested by McGrow's comparison test using 4 - 5 kg polymer (col 7 line 59) so that true side-by-side comparisons can be made.

Per claim 8, McGrow states that coagulant beads can be added directly to the suspension followed by addition of an anionic flocculent. McGrow col 4 lines 4 - 13.

Per claims 10 and 12, McGrow describes using 10 parts coagulant polymer for each part flocculant polymer (col 5 lines 56-63, especially line 61). Alternatively, per claims 12 and 13, it would have been obvious to have optimized the relative proportion

[3] Assume one ton (2000 lb) dry solids suspended in a 1% solids suspension with 4 kg added polymer.

of the coagulant and flocculant because this process parameter is well-known to be result- effective in flocculation processing.

Per claim 11, see col 9 lines 7 - 41, particularly lines 10 - 11, as well as col 6 line 55 of USP 5178774 to Payne (incorporated by reference into McGrow). Payne teaches using anionic flocculants that are at least 50% anionic. Applicant / owner's claim-recited limitation that the anionic polyacrylamide be "about 40% anionic" reads on Payne's description of the anionic polyacrylamide flocculant that is 50% anionic. Alternatively, it would have been obvious to have varied the mol % of the charged (anionic) monomer in the flocculant copolymer to optimize dewatering performance because percent charge is a known result-effective variable, as shown by McGrow and Payne.

Per claim 14, McGrow[4] suggests treating a biological sludge mixed with a primary sludge.

Per claim 22 and claim 33, as set forth above, Eberhard as modified by McGrow describes a method for dewatering a sludge comprising thermophiles in which the sludge is contacted by a polymeric quaternary ammonium compound, i.e., poly(DADMAC), along with a cationic polyacrylamide. The two compounds meet the molecular weight limitations of claim 24. McGrow describes the compounds functioning in the manner set forth in claim 25.

Eberhard, McGrow, and Sak

[4] McGrow describes conditioning of a “digested primary/activated/humus sludge.”

Claim 14 is rejected under 35 USC Sec. 103(a) over Eberhard, McGrow, Payne and Willliams, as applied to claim 1 above, further in view of USP 3397139 to Sak. Sak teaches it was conventional to dewater combined primary and secondary sludges. Accordingly, it would have been obvious to have mixed Eberhard's sludge with primary sludge before thermophilic sludge treatment of the same, as suggested by Sak.

Eberhard, McGrow, Willliams, and Coscia, Tanaka, or Neff

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eberhard, McGrow, Payne and Willliams, as applied to claim 1 above, further in view of USP 4137165 to Coscia, USP 4155847 to Tanaka, or USP 5405554 to Neff.

McGrow describes using a polyamine made from the condensation of epichlorohydrin and an amine, but does not specifically describe poly(epichlorohydrin-***dimethyl*** amine). It would have been obvious to have selected poly(epi-DMA) for use as the polyamine taught by McGrow because Coscia teaches that poly(epi-DMA) is an available polyamine known for use as a polymeric flocculent, because Tanaka teaches that the polycondensate of epichlorohydrin and dimethylamine is a commercially sold sewage dewatering flocculent product (col 8, Table footnote, Sample D), or because Neff teaches that preferred low molecular weight sludge dewatering cationic polyamine is poly(epi-DMA) (col 6).

Eberhard and Payne

Claims 33, 35, 38, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5019267 to Eberhard and McGrow, as applied to claim 33 above, further in view of USP 5178774 to Payne.

USP 5019267 to Eberhard describes a method for dewatering biological sludge from a digestion process. Eberhard describe heating the biological sludge to 75°C (Example 3, claim 8) then adding a cationic polymeric flocculent ZETAG 92 (Eberhard at col 5 line 58). Eberhard does not describe the addition to the sludge of a polymeric quaternary ammonium compound.

McGrow suggests substituting simultaneous addition of cationic polyDADMAC coagulant and cationic polyacrylamide flocculent for the prior art addition of cationic polyacrylamide flocculent alone. McGrow, including the Payne portion thereof, suggests substitution of addition of cationic polyDADMAC (a quarternary ammonium compound) coagulant (Payne, col 7 line 35, col 8 line 3) followed by an anionic high molecular weight polyacrylamide flocculent (col 9 lines 30 – 32) in place of Eberhard's cationic polyacrylamide alone.

The proportions recited in claim 40 are suggested by McGrow or the result of routine experimentation because dose is a known result-effective variable in the sludge conditioning art.

Art Cited of Interest

USP 3462275 to Bellamy describes a thermophilic digestion process, preferably one that takes place at 55 – 70°C in order to pasteurize the sludge, i.e., kill pathogenic organisms (col 2 line 1, 16+).

USP 5989392 to Tang describes uses of DADMAC.

US 4588508 Allenson is cited of interest.

Response to Applicant's Arguments

Applicant's claims do not exclude the addition to the sludge of materials that are not recited in applicant's claims. Therefore, even if Eberhard described the addition of materials, e.g., enzyme and chelant, such additions do not negate the fact that Eberhard describes dewatering of a biological sludge from a thermophilic digestion process using a cationic polyacrylamide. Insofar as Applicant's claimed method is not limited to the addition to the thermophilic biological sludge of ***only*** a polymeric quaternary ammonium compound and the particular claimed-specified polyacrylamide, Eberhard's addition of other materials is not a teaching away of the ***claimed*** invention.

Even if McGrow teaches that addition of cationic polyacrylamide alone is sufficient to reduce treatment costs, such observation does not constitute a teaching away of use of cationic polyacrylamide in combination with poly(DADMAC)(col 4line 37) (or polyamine made by condensation of epichlorohydrin with an amine) (col 4 line 29) coagulant solution. The straightforward reason is that McGrow describes the use of

both polyacrylamide and poly(DADMAC) (or polyamine). If a reference teaches “X,” the reference clearly does not "teach away" from "X."

The fact that Dental et al. and/or Chitikela et al. used one approach does not dilute the teachings of others working in the field, e.g., Eberhard and McGrow.

Applicant's argument (Response 7/6/09 at page 24) that the claimed invention was not obvious in Sept. 1990 is inapposite for the relevant time period is "at the time the [applicant’s] invention was made." Insofar as the Prakasam (EPA Project Summary) report of Sept 1990 antedated the publication of the prior art relied upon by the examiner, i.e., Eberhard and McGrow, its teachings – whatever they might be - are of limited relevance for they do not represent the state of the art at the relevant time period.

With respect to applicant’s argument that no essential step is missing from claim 33, the examiner adds that the specification refers to the polyquaternary amine as the “primary component” to form microflocs. It would have been clear to the person having ordinary skill in this art that applicant believed that a “bridging” compound, e.g., polyacrylamide, was required to effectively dewater the sludge. It is noted that no working (or prophetic) example uses polyquaternary amine alone without also using a polyacrylamide to effect acceptable dewatering performance.

<u>THIS ACTION IS MADE FINAL</u>

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

/Chester T. Barry/

Primary Examiner, Art Unit 1797

571-272-1152